What is Claimed is:

1. An integrated circuit comprising:

a circuit that has metal-oxide-semiconductor transistors with threshold voltages that change with age and that is powered by a power supply voltage; and

monitoring and compensation circuitry that measures the threshold voltage changes and that compensates for the threshold voltage changes by adjusting the power supply voltage.

2. The integrated circuit defined in claim 1 wherein the monitoring and compensation circuitry comprises a continuously-biased threshold voltage monitoring circuit and an intermittently-biased threshold voltage monitoring circuit that are used to make differential measurements of the threshold voltage changes.

3. The integrated circuit defined in claim 1 wherein the monitoring and compensation circuitry further comprises temperature monitoring circuitry for monitoring temperature on the integrated circuit and wherein the monitoring and compensation circuitry adjusts the power supply voltage in real time to compensate for both the threshold voltage changes and changes in temperature.

4. The integrated circuit defined in claim 1

wherein the monitoring and compensation circuitry comprises:

a threshold voltage monitoring circuit;

an analog-to-digital converter that digitizes signals from the threshold voltage monitoring circuit to measure the threshold voltage changes;

a control unit; and

a digital-to-analog converter that the control unit uses to adjust the power supply voltage based on the threshold voltage changes measured using the analog-to-digital converter.

5. The integrated circuit defined in claim 1 wherein the monitoring and compensation circuitry further comprises temperature monitoring circuitry having an adjustable current source and a diode.

6. The integrated circuit defined in claim 1 further comprising a threshold voltage monitoring circuit having at least one continuously-biased transistor and at least one intermittently-biased transistor, wherein the threshold voltage monitoring circuit is used to make measurements of the threshold voltage changes by comparing threshold voltages measurements for the continuously-biased transistor with threshold voltage measurements for the intermittently-biased transistor.

7. The integrated circuit defined in claim 1

comprising:

a continuously-biased threshold voltage monitoring circuit having at least one continuously-biased transistor;

an intermittently-biased threshold voltage monitoring circuit having at least one intermittently-biased transistor;

a multiplexer having respective inputs connected to the continuously-biased threshold voltage monitoring circuit and the intermittently-biased threshold voltage monitoring circuit and having an output; and

an analog-to-digital converter that digitizes signals from the output of the multiplexer, wherein the multiplexer and analog-to-digital converter are used to make measurements of the threshold voltage changes by comparing threshold voltages measurements from the continuously-biased transistor with threshold voltage measurements from the intermittently-biased transistor.

8. The integrated circuit defined in claim 1 wherein the circuit that has the metal-oxide-semiconductor transistors comprises n-channel and p-channel metal-oxide-semiconductor transistors having threshold voltages that increase with age due to negative bias temperature instability and gate-oxide charge trapping and wherein the monitoring and compensation circuitry produces a positive power supply

voltage Vcc' that increases with age to compensate for the effects of the increased threshold voltages of the n-channel and p-channel metal-oxide-semiconductor transistors.

9. The integrated circuit defined in claim 1 wherein the circuit that has the metal-oxide-semiconductor transistors comprises a voltage-controlled oscillator.

10. The integrated circuit defined in claim 1 wherein the monitoring and compensation circuitry comprises:

a threshold voltage monitoring circuit that measures the threshold voltage;

a temperature monitoring circuit that monitors temperature on the integrated circuit;

a multiplexer having respective inputs connected to the threshold voltage monitoring circuit and temperature monitoring circuit and having an output; and

an analog-to-digital converter that digitizes signals from the output of the multiplexer, wherein the digitized signals are used in adjusting the power supply voltage to compensate for the threshold voltage changes and changes in temperature.

11. A method for compensating an integrated circuit having metal-oxide-semiconductor transistors

with threshold voltages for threshold voltage changes due to age, comprising:

monitoring the threshold voltage changes; and

adjusting at least one power supply voltage on the integrated circuit to compensate for the threshold voltage changes.

12. The method defined in claim 11 wherein:

the metal-oxide-semiconductor transistor threshold voltages increase with age;

the metal-oxide-semiconductor transistors are used in a circuit that is powered by the power supply voltage; and

adjusting the power supply voltage comprises increasing the power supply voltage to compensate for the threshold voltage changes.

13. The method defined in claim 11 wherein monitoring the threshold voltage changes comprises continuously biasing at least one transistor in a continuously-biased monitoring circuit and intermittently biasing at least one transistor in an intermittently-biased monitoring circuit.

14. The method defined in claim 11 wherein monitoring the threshold voltage change comprises comparing at least some threshold voltage measurements to baseline threshold voltage measurements made on the

integrated circuit.

15. The method defined in claim 11 wherein the metal-oxide-semiconductor transistors comprise n-channel metal-oxide-semiconductor transistors having a threshold voltage Vtn and p-channel metal-oxide-semiconductor transistors having a threshold voltage Vtp, wherein Vtn increases with time by an amount ΔVtn due to gate-oxide charge trapping and wherein Vtp increases with time by an amount ΔVtp due to negative bias temperature instability, wherein the power supply voltage is a positive power supply voltage Vcc', and wherein adjusting the power supply voltage comprises increasing Vcc' with time by an amount equal to ΔVtn plus ΔVtp.

16. The method defined in claim 11 wherein the integrated circuit comprises a phase-locked-loop circuit and wherein adjusting the power supply voltage to compensate for the threshold voltage changes comprises increasing the power supply voltage with time to stabilize the phase-locked-loop circuit.

17. The method defined in claim 11 wherein the integrated circuit comprises a delay-locked-loop circuit and wherein adjusting the power supply voltage to compensate for the threshold voltage changes comprises increasing the power supply voltage with time to stabilize the delay-locked-loop circuit.

18. The method defined in claim 11 wherein the metal-oxide-semiconductor transistor threshold voltages increase with age and the metal-oxide-semiconductor transistors are used in a circuit that is powered by the power supply voltage, the method further comprising making temperature measurements on the integrated circuit, wherein adjusting the power supply voltage comprises adjusting the power supply voltage to compensate for the threshold voltage changes and temperature changes.

19. The method defined in claim 11 further comprising:

making temperature measurements on the integrated circuit; and

adjusting the power supply voltage based on the temperature measurements to compensate for effects due to temperature changes.

20. The method defined in claim 19 further comprising using an adjustable current source and a diode to make the temperature measurements.